EXAMPLE 7. *The distance between Richa's house and her school hostel is* 61 km. *For reaching her house from the hostel, she covers* 54 km 860 m *by taxi,* 5 km 65 m *by tonga and the rest of the distance by rickshaw. How much distance did Richa cover by rickshaw?*

Solution

Distance covered by taxi = 54.860 km
Distance covered by tonga = + 5.065 km
Total distance covered by taxi and tonga = 59.925 km
Total distance to be covered by Richa = 61.000 km
Distance covered by taxi and tonga = − 59.925 km
∴ distance covered by rickshaw = 1.075 km

Hence, the distance covered by rickshaw = 1.075 km
= 1 km 75 m.

EXAMPLE 8. *The total weight of a bag containing* 13 kg 750 g *of potatoes and* 8 kg 80 g *of tomatoes is* 22 kg 200 g. *How much is the weight of the empty bag?*

Solution

Weight of potatoes = 13 kg 750 g = 13.750 kg
Weight of tomatoes = 8 kg 80 g = + 8.080 kg
Total weight of vegetables = 21.830 kg
Total weight of the bag and vegetables = 22.200 kg
Total weight of vegetables in it = − 21.830 kg
Weight of the empty bag = 0.370 kg

Hence, the weight of the empty bag = 0.370 kg
= 370 g.

EXERCISE 7D

Subtract:

1. 27.86 from 53.74
2. 64.98 from 103.87
3. 59.63 from 92.4
4. 56.8 from 204
5. 127.38 from 216.2
6. 39.875 from 70.68
7. 348.237 from 523.12
8. 458.573 from 600
9. 149.456 from 206.321
10. 0.612 from 3.4

Simplify:

11. 37.6 + 72.85 − 58.678 − 6.09
12. 75.3 − 104.645 + 178.96 − 47.9
13. 213.4 − 56.84 − 11.87 − 16.087
14. 76.3 − 7.666 − 6.77
15. What is to be added to 74.5 to get 91?
16. What is to be subtracted from 7.3 to get 0.862?
17. By how much should 23.754 be increased to get 50?
18. By how much should 84.5 be decreased to get 27.84?
19. If the school bags of Neelam and Garima weigh 6 kg 80 g and 5 kg 265 g respectively, whose bag is heavier and by how much?
20. Kunal purchased a notebook for ₹ 19.75, a pencil for ₹ 3.85 and a pen for ₹ 8.35 from a book shop. He gave a 50-rupee note to the shopkeeper. What amount did he get back?
21. Sunita purchased 5 kg 75 g of fruits and 3 kg 465 g of vegetables, and put them in a bag. If this bag with these contents weighs 9 kg, find the weight of the empty bag.

22. The distance between Reeta's house and her office is 14 km. She covers 10 km 65 m by scooter, 3 km 75 m by bus and the rest on foot. How much distance does she cover by walking?

EXERCISE 7E

OBJECTIVE QUESTIONS

Mark (✓) against the correct answer in each of the following:

1. $\frac{7}{10} = ?$

(a) 7.1 (b) 1.7 (c) 0.7 (d) 0.07

2. $\frac{5}{100} = ?$

(a) 5.1 (b) 5.01 (c) 0.5 (d) 0.05

3. $\frac{9}{1000} = ?$

(a) 0.0009 (b) 0.009 (c) 9.001 (d) none of these

4. $\frac{16}{1000} = ?$

(a) 0.016 (b) 0.16 (c) 0.0016 (d) 1.006

5. $\frac{134}{1000} = ?$

(a) 13.4 (b) 1.34 (c) 0.134 (d) 0.0134

6. $2\frac{17}{100} = ?$

(a) 2.17 (b) 2.017 (c) 0.217 (d) 21.7

7. $4\frac{3}{100} = ?$

(a) 4.3 (b) 4.03 (c) 4.003 (d) 43.10

8. $6.25 = ?$

(a) $6\frac{1}{2}$ (b) $6\frac{1}{4}$ (c) $62\frac{1}{2}$ (d) none of these

9. $\frac{6}{25} = ?$

(a) 2.4 (b) 0.24 (c) 0.024 (d) none of these

10. $4\frac{7}{8} = ?$

(a) 4.78 (b) 4.87 (c) 4.875 (d) none of these

11. $24.8 = ?$

(a) $24\frac{4}{5}$ (b) $24\frac{2}{5}$ (c) $24\frac{1}{5}$ (d) none of these

12. $2\frac{1}{25} = ?$

(a) 2.4 (b) 2.04 (c) 2.004 (d) none of these

13. $2 + \frac{3}{10} + \frac{4}{100} = ?$

(a) 2.304 (b) 2.403 (c) 2.34 (d) none of these

14. $2 + \frac{6}{100} = ?$

(a) 2.006 (b) 2.06 (c) 2.6 (d) none of these

15. $\frac{4}{100} + \frac{7}{10000} = ?$

(a) 0.47 (b) 0.407 (c) 0.0407 (d) none of these

Hint. *Given exp.* = 0.04 + 0.0007.

16. The correct expanded form of 2.06 is

(a) $(2 \times 10) + \left(6 \times \frac{1}{10}\right)$ (b) $(2 \times 1) + \left(6 \times \frac{1}{10}\right)$

(c) $(2 \times 1) + \left(6 \times \frac{1}{100}\right)$ (d) none of these

17. Among 2.6, 2.006, 2.66 and 2.08, the largest number is

(a) 2.006 (b) 2.08 (c) 2.6 (d) 2.66

18. Which of the following is the correct order?

(a) 2.2 < 2.02 < 2.002 < 2.222 (b) 2.002 < 2.02 < 2.2 < 2.222

(c) 2.02 < 2.22 < 2.002 < 2.222 (d) none of these

19. Which is larger: 2.1 or 2.055?

(a) 2.1 (b) 2.055 (c) cannot be compared

20. 1 cm = ?

(a) 0.1 m (b) 0.01 m (c) 0.001 m (d) none of these

21. 2 m 5 cm = ?

(a) 2.5 m (b) 2.05 m (c) 2.005 m (d) 0.25 m

22. 2 kg 8 g = ?

(a) 2.8 kg (b) 2.08 kg (c) 2.008 kg (d) none of these

23. 2 kg 56 g = ?

(a) 2.56 kg (b) 2.056 kg (c) 2.560 kg (d) none of these

24. 2 km 35 m = ?

(a) 2.35 km (b) 2.350 km (c) 2.035 km (d) none of these

25. 0.4 + 0.004 + 4.4 = ?

(a) 4.444 (b) 5.2 (c) 4.804 (d) 5.404

26. 3.5 + 4.05 – 6.005 = ?

(a) 1.545 (b) 1.095 (c) 1.6 (d) none of these

27. 6.3 – 2.8 = ?

(a) 0.35 (b) 3.5 (c) 3.035 (d) none of these

28. 5.01 – 3.6 = ?

(a) 4.65 (b) 1.95 (c) 1.41 (d) none of these

29. $2 - 0.7 = ?$
(a) 1.3 (b) 1.5 (c) 2.03 (d) none of these

30. $1.1 - 0.3 = ?$
(a) 0.8 (b) 0.08 (c) 8 (d) none of these

Things to Remember

1. *The fractions in which the denominators are 10, 100, 1000, etc., are known as decimal fractions.*
2. *Numbers written in decimal form are called decimals.*
3. *A decimal has two parts, namely, the whole-number part and the decimal part.*
4. *The number of digits contained in the decimal part of a decimal is called the number of its decimal places.*
5. *Decimals having the same number of decimal places are called like decimals; otherwise, they are known as unlike decimals.*
6. *We have* $0.1 = 0.10 = 0.100$, *etc.*, $0.2 = 0.20 = 0.200$, *etc., and so on.*
7. *We may convert unlike decimals into like decimals by annexing the requisite number of zeros at the end of the decimal part.*
8. *Comparing decimals:*
   Step 1. *Convert the given decimals into like decimals.*
   Step 2. *First compare the whole-number parts. The decimal having larger whole-number part is larger than the other.*
   Step 3. *If the whole-number parts are equal, compare the tenths digits. The decimal having bigger digit in the tenths place is the larger one.*
   If the tenths digits are equal, compare the hundredths digits, and so on.
9. *Addition of decimals:*
   Step 1. *Convert the given decimals into like decimals.*
   Step 2. *Write the addends one under the other so that the decimal points of all the addends are in the same column.*
   Step 3. *Add as in case of whole numbers.*
   Step 4. *In the sum, put the decimal point directly under the decimal points in the addends.*
10. *Subtraction of decimals:*
   Step 1. *Convert the given decimals into like decimals.*
   Step 2. *Write the smaller number under the larger one so that their decimal points are in the same column.*
   Step 3. *Subtract as in the case of whole numbers.*
   Step 4. *In the difference, put the decimal point directly under the decimal points of the given numbers.*

TEST PAPER-7

A. **1.** Convert $4\frac{5}{8}$ into a decimal fraction.

2. Express 105 cm into metres using decimals.

3. Express 6 km 5 m as km using decimals.

4. Express 8 m as kilometre using decimals.

5. Add 26.4, 163.05, 8.75 and 5.6.

6. Subtract 0.528 from 3.2.

7. What is to be added to 63.5 to get 71?

8. What is to be subtracted from 13 to get 5.4?

9. Arrange the following decimals in descending order:
6.5, 6.05, 6.54, 6.4 and 6.45

10. Convert each of the following into a fraction in simplest form:
(i) .4 (ii) .35 (iii) 0.08 (iv) 0.075

B. ***Mark (✓) against the correct answer in each of the following:***

11. $\frac{3}{25} = ?$
(a) 1.2 (b) 0.12 (c) 0.012 (d) none of these

12. $\frac{6}{1000} = ?$
(a) 6.001 (b) 0.0006 (c) 0.006 (d) 0.06

13. $2\frac{3}{100} = ?$
(a) 2.003 (b) 2.03 (c) 2.3 (d) none of these

14. The place value of 3 in 16.534 is
(a) $\frac{3}{10}$ (b) $\frac{3}{100}$ (c) $\frac{3}{1000}$ (d) 3

15. $4\frac{7}{8} = ?$
(a) 4.78 (b) 4.87 (c) 4.875 (d) none of these

16. $5.01 - 3.6 = ?$
(a) 4.65 (b) 1.95 (c) 1.41 (d) none of these

17. $3.5 + 4.05 - 6.005 = ?$
(a) 1.545 (b) 1.095 (c) 1.6 (d) none of these

18. $\frac{4}{100} + \frac{7}{10000} = ?$
(a) 0.47 (b) 0.407 (c) 0.0407 (d) none of these

19. Among 2.6, 2.006, 2.66 and 2.08, the largest number is
(a) 2.006 (b) 2.08 (c) 2.6 (d) 2.66

C. **20.** ***Fill in the blanks.***
(i) 1 m = ... km (ii) 10 ml = ... l

(iii) 16 kg 5 g = ... kg (iv) 2 m 8 cm = ... m

(v) 3.02, 4.75, 1.63 are examples of ..... decimals.

D. 21. ***Write 'T' for true and 'F' for false for each of the statements given below:***

(i) $3.02 < 3.2$. (ii) 3 g = 0.003 kg.

(iii) $\frac{341}{1000} = 3.410$. (iv) 6.2 and 6.200 are equivalent decimals.

(v) 2.3, 3.41, 4.53, 5.61 are examples of like decimals.

EXERCISE 8A

1. Write the following using literals, numbers and signs of basic operations:
   (i) x increased by 12 (ii) y decreased by 7
   (iii) The difference of a and b, when $a > b$
   (iv) The product of x and y added to their sum
   (v) One-third of x multiplied by the sum of a and b
   (vi) 5 times x added to 7 times y
   (vii) Sum of x and the quotient of y by 5
   (viii) x taken away from 4
   (ix) 2 less than the quotient of x by y
   (x) x multiplied by itself (xi) Twice x increased by y
   (xii) Thrice x added to y squared (xiii) x minus twice y
   (xiv) x cubed less than y cubed (xv) The quotient of x by 8 is multiplied by y
2. Ranjit scores 80 marks in English and x marks in Hindi. What is his total score in the two subjects?
3. Write the following in the exponential form:
   (i) $b \times b \times b \times \ldots$ 15 times (ii) $y \times y \times y \times \ldots$ 20 times
   (iii) $14 \times a \times a \times a \times a \times b \times b \times b$ (iv) $6 \times x \times x \times y \times y$
   (v) $3 \times z \times z \times z \times y \times y \times x$
4. Write down the following in the product form:
   (i) x^2y^4 (ii) $6y^5$ (iii) $9xy^2z$ (iv) $10a^3b^3c^3$

ALGEBRAIC EXPRESSIONS

VARIABLES AND CONSTANTS In algebra, we come across two types of symbols, namely, constants and variables.

A symbol having a fixed numerical value is called a ***constant.*** *And, a symbol which takes on various numerical values is known as a* ***variable.***

Consider the following examples:

The diameter d of a circle of radius r is given by the formula $d = 2r$.
Here, 2 is a fixed number and, therefore, a constant, whereas the literal numbers d and r depend upon the size of the circle and, therefore, they may take on various values. So, d and r are variables.
Similarly, the perimeter p of a square of side s is given by the formula $p = 4s$.
Here 4 is a constant, whereas p and s are variables.

REMARK In some situations literal numbers are also treated as constants. In such situations, it is presumed that the particular literal number will only take a fixed value.

ALGEBRAIC EXPRESSION *A combination of constants and variables connected by any one or more of the symbols +, −, × and ÷ is called an algebraic expression. The several parts of the expression, separated by the sign + or −, are called the terms of the expression.*

Thus, (i) the expression $3x + 5y - 2xyz$ has three terms, namely, $3x$, $5y$ and $-2xyz$,
(ii) the expression $5x^2 - 6x^3y + 8xy^3z - 9$ has four terms, namely, $5x^2$, $-6x^3y$, $8xy^3z$ and -9.

Solution (i) Substituting $x = 1$, $y = -2$ and $z = 3$ in the given expression, we get:

$$x^3 + y^3 + z^3 - 3xyz = (1)^3 + (-2)^3 + (3)^3 - 3 \times 1 \times (-2) \times 3$$
$$= 1 - 8 + 27 + 18 = 38.$$

(ii) Substituting $x = 1$, $y = -2$ and $z = 3$ in the given expression, we get:

$$3xy^4 - 15x^2y + 4z = 3 \times 1 \times (-2)^4 - 15 \times (1)^2 \times (-2) + 4 \times 3$$
$$= 3 \times 1 \times 16 + 30 + 12 = 48 + 30 + 12 = 90.$$

EXAMPLE 2. *Identify monomials, binomials and trinomials from the following expressions:*

(i) $-3xyz$ *(ii)* $4x^2yz + 9 - 5x^3$ *(iii)* -7
(iv) $x^2 + y^2 + z^2 - p^2$ *(v)* $x + 5$ *(vi)* $6a^3b$

Solution Clearly, each of the expressions given in (i), (iii) and (vi) contains only one term. So, each one of them is a monomial.
The expression given in (v) contains two terms, and therefore, it is a binomial.
The expression given in (ii) contains three terms, and therefore, it is a trinomial.
The expression given in (iv) contains four terms, so it is none of the given type.

EXAMPLE 3. *Write down the coefficient of*

(i) x *in* $9xy$ *(ii)* a *in* $-7abc$ *(iii)* xyz *in* $-xyz$ *(iv)* b *in* $-abc$

Solution
(i) The coefficient of x in $9xy$ is $9y$.
(ii) The coefficient of a in $-7abc$ is $-7bc$.
(iii) The coefficient of xyz in $-xyz$ is -1.
(iv) The coefficient of b in $-abc$ is $-ac$.

EXERCISE 8B

1. If $a = 2$ and $b = 3$, find the value of

(i) $a + b$ (ii) $a^2 + ab$ (iii) $ab - a^2$
(iv) $2a - 3b$ (v) $5a^2 - 2ab$ (vi) $a^3 - b^3$

2. If $x = 1$, $y = 2$ and $z = 5$, find the value of

(i) $3x - 2y + 4z$ (ii) $x^2 + y^2 + z^2$ (iii) $2x^2 - 3y^2 + z^2$
(iv) $xy + yz - zx$ (v) $2x^2y - 5yz + xy^2$ (vi) $x^3 - y^3 - z^3$

3. If $p = -2$, $q = -1$ and $r = 3$, find the value of

(i) $p^2 + q^2 - r^2$ (ii) $2p^2 - q^2 + 3r^2$ (iii) $p - q - r$
(iv) $p^3 + q^3 + r^3 + 3pqr$ (v) $3p^2q + 5pq^2 + 2pqr$ (vi) $p^4 + q^4 - r^4$

4. Write the coefficient of

(i) x in $13x$ (ii) y in $-5y$ (iii) a in $6ab$ (iv) z in $-7xz$
(v) p in $-2pqr$ (vi) y^2 in $8xy^2z$ (vii) x^3 in x^3 (viii) x^2 in $-x^2$

5. Write the numerical coefficient of

(i) ab (ii) $-6bc$ (iii) $7xyz$ (iv) $-2x^3y^2z$

6. Write the constant term of

(i) $3x^2 + 5x + 8$ (ii) $2x^2 - 9$ (iii) $4y^2 - 5y + \frac{3}{5}$ (iv) $z^3 - 2z^2 + z - \frac{8}{3}$

7. Identify the monomials, binomials and trinomials in the following:

(i) $-2xyz$ (ii) $5 + 7x^3y^3z^3$ (iii) $-5x^3$
(iv) $a + b - 2c$ (v) $xy + yz - zx$ (vi) x^5
(vii) $ax^3 + bx^2 + cx + d$ (viii) -14 (ix) $2x + 1$

8. Write all the terms of the algebraic expressions:
   (i) $4x^5 - 6y^4 + 7x^2y - 9$
   (ii) $9x^3 - 5z^4 + 7x^3y - xyz$
9. Identify the like terms in the following:
   (i) $a^2, b^2, -2a^2, c^2, 4a$
   (ii) $3x, 4xy, -yz, \frac{1}{2}zy$
   (iii) $-2xy^2, x^2y, 5y^2x, x^2z$
   (iv) $abc, ab^2c, acb^2, c^2ab, b^2ac, a^2bc, cab^2$

OPERATIONS ON ALGEBRAIC EXPRESSIONS